Regency COMMUNICATIONS INC.

SERVICE MANUAL

VHF FM TRANSCEIVER
LOW BAND

MODEL MCL 60

1227 S. PATRICK DR.
SATELLITE BEACH, FLA.

0300-4154-700

PRINTED IN USA
3-80

SERVICE INFORMATION FOR MCL 60

1. Test Procedure - TP-14-214
2. PA Board Parts Overlay Showing Circuitry
3. Control Panel Parts Overlay Showing Circuitry
4. Main Board Parts Placement Diagram
5. Main Board Parts Overlay Showing Circuitry
6. Radio Schematic - 704-039
7. Parts List

APPLICATION	
NEXT ASSY	USED ON
	MCL 60

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	R135	9/1/79	
B	EN AB007	1/18/80	

REV B | SH 1 | DWG. NO. TP14-214

FINAL TEST PROCEDURE MICRO-COM L 60 SERIES

A. Transmitter Alignment

I. Test Set-Up

A. Equipment

1. MICRO-COM L 60 Transceiver
2. HP 410 DC VTVM
3. DC Power Supply with Ammeter 13.6 VDC 15 Amps DC
4. VOM Simpson 360 (Digital)
5. AC VTVM
6. Audio Oscillator
7. Mic matching network
8. 25-60 MHZ Thruline Wattmeter, 30 db Power Pad
9. Spectrum Analyzer
10. Deviation Meter*
11. Frequency Counter*
12. Small Blade Tuning Tool and Hex Tuning Tool
13. Tune-Up Crystal
14. Band Reject Filter
15. PTT Switch

*Can be replaced with Cushman or similar equipment

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE			APPROVALS	DATE
FRACT. ±	DEC .XX± .XXX±	ANG. ±	DRAWN GM	9/27/79
			CHECKED	
			DFTG. SUPV.	
TERIAL			ENGR. RKE	9/11/79
FINISH				
DO NOT SCALE DRWG.				

Regency®
COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

TEST PROCEDURE MICRO-COM L 60

SIZE	PART NUMBER	REV.
A	TP14-214	B

SCALE

SHEET 1 OF 13

B. Test Interconnection Diagram

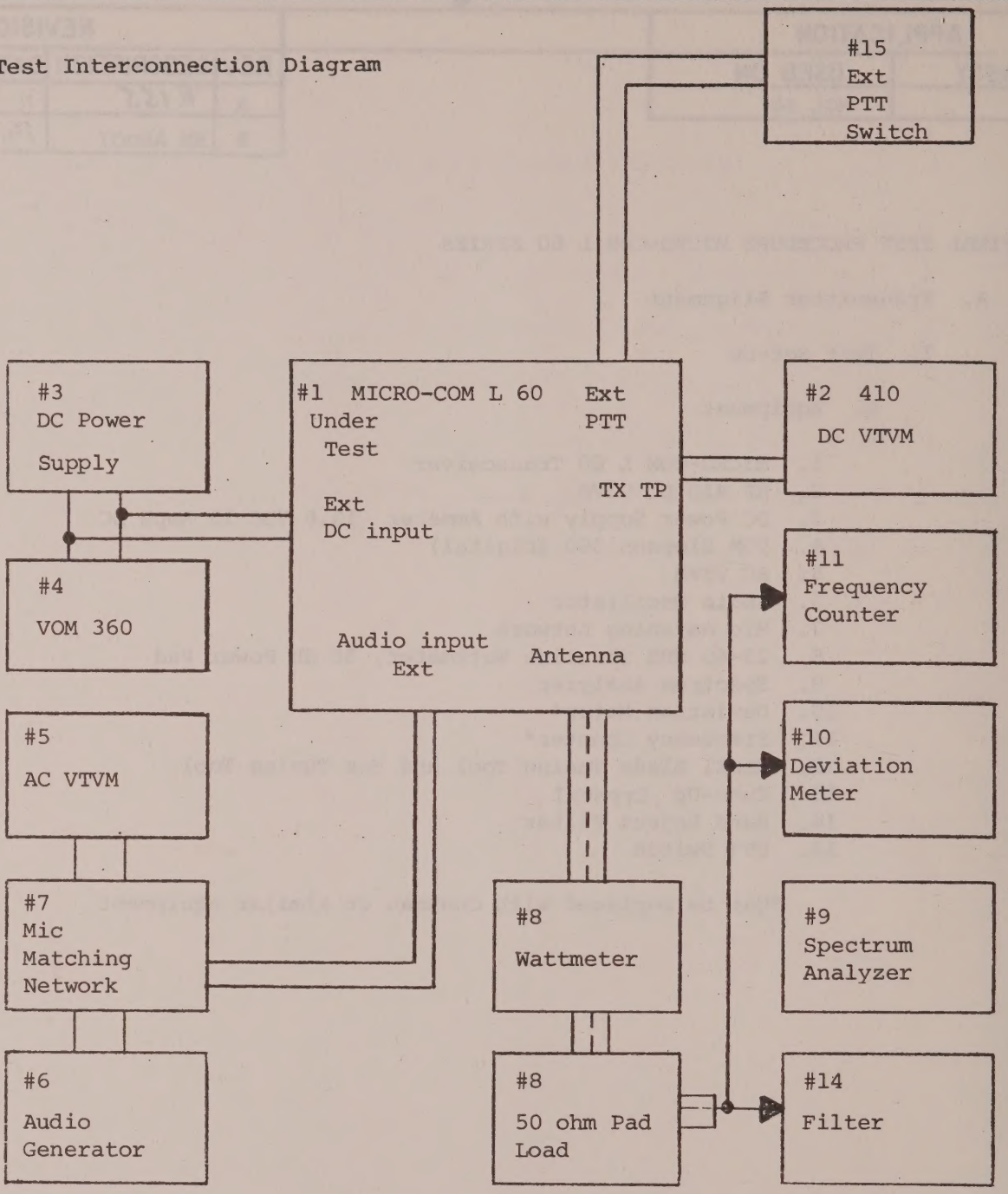
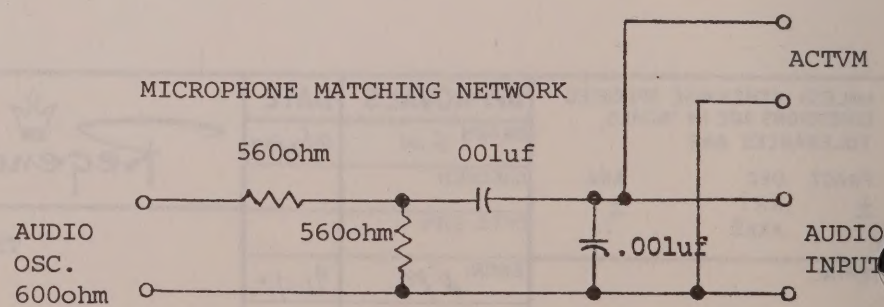


FIGURE I



DRAWN	DATE	SIZE	PART NUMBER		REV.
APPROVED RKG	DATE 11/2/79	A	TP14-214		B
DO NOT SCALE DWG.		SCALE			SHEET 2

REV. B SH. 2 TP14-214 DWG. NO.

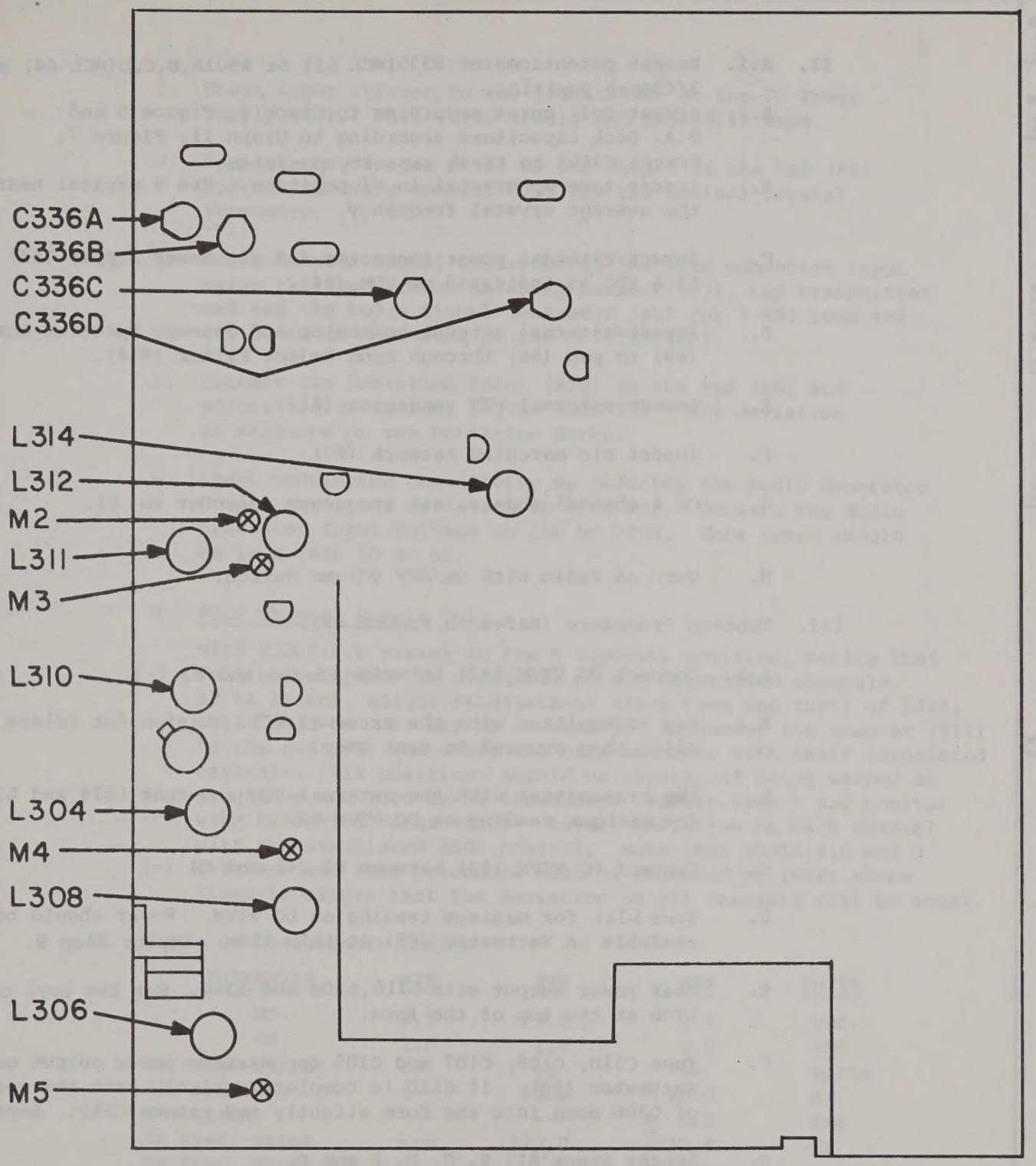


FIGURE 2

TRANSMITTER BOARD TUNING POINTS

DRAWN DJB	DATE	SIZE A	PART NUMBER TP 14-214	REV. B	
APPROVED RLS	DATE 6/14/79				
DO NOT SCALE DWG.		SCALE —		SHEET 3	

II. A.1. Preset potentiometer R335(MCL 61) or R501A,B,C,D(MCL 64) at 3/4 open position.

A.2. Preset coil cores according to Graph I, Figure 5 and P.A. Deck capacitors according to Graph II, Figure 7. Preset C366A to the ½ capacity position.

B. Insert tune-up crystal in F1 position. Use a crystal nearest the average crystal frequency.

C. Insert External power connector and set Power Supply (#3) to 13.6 VDC as indicated on VOM (#4).

D. Insert external antenna connector and connect Spectrum Analyzer (#9) to pad (#8) through Band Reject Filter (#14).

E. Insert external PTT connector (#16).

F. Insert mic matching network (#7).

G. On 4 channel models, set frequency selector to F1.

H. Turn on radio with ON/OFF VOlume Switch.

III. Tune-up Procedure (Refer to Figure #2).

A.1. Connect DC VTVM (#2) between P5 (+) and M3 (-).

A.2. Key transmitter with the external PTT. Listen for relays to click then proceed to next step.

B. Key transmitter with the external PTT and tune L314 and L312 for maximum reading on DC VTVM #2.

C. Connect DC VTVM (#2) between P2 (+) and M4 (-).

D. Tune L311 for maximum reading on DC VTVM. Power should be readable on Wattmeter (#8) at this time. Repeat Step B.

E. Peak power output with L310, L308 and L304. Set the core of L306 at the top of the form.

F. Tune C110, C108, C107 and C105 for maximum power output on Wattmeter (#8). If C110 is completely tight, turn the core of L306 down into the form slightly and retune C110. Repeat.

G. Repeat Steps A1, B, C, D, E and F.

H. Set the Spectrum Analyzer (#9) and Band Reject Filter (#14) for maximum carrier indication on the 0 db reference line. Attenuate the carrier with the Band Reject Filter (#14) a minimum of 30 db. Check for 2nd harmonic level on the Spectrum Analyzer. The second harmonic should be greater than 61 db down.

I. Check input current to the transceiver on the DC Power Supply (#3). This level should not exceed 12 amps.

J. Connect the Counter (#11) to the output of the Pad (#8) and set the warp control C335 for the nominal crystal frequency.

K. Connect Audio Signal Generator to the mike connector input using the appropriate matching network (#7), key transmitter and set the Audio Signal Generator (#6) for 1 KHz tone and 150 mv AC as indicated on the AC VTVM (#5).

L. Connect the Deviation Meter (#10) to the Pad (#8) and adjust the deviation, adjust R335 for ± KHz deviation as measured on the Deviation Meter.

M. Check modulation sensitivity by reducing the Audio Generator Output until the deviation is ±3.0 KHz. Measure the Audio Generator Input Voltage on the AC VTVM. This level should be less than 20 mv AC.

N. Four Channel Models Only

With C336B,C,D preset to the ½ capacity position, verify that full output power is available on all crystalled channels. If it is not, slight readjustment (less than one turn) of L314, L312, L311 or L310 may be necessary. Reconnect the counter (#11) to the pad (#8) and check all warp controls with their associated crystals. All positions should be capable of being warped on frequency and ±500 Hz of frequency. Repeat Step K and monitor with Deviation Meter (#10). Adjust deviation on each channel with the associated R501 control. Note that R501A,B,C and D interact and this procedure must be repeated at least three times to assure that the deviation on all channels will be equal.

IV. Table of Performance Limits

PARAMETER	MIN	TYP	MAX	UNITS
M3	2.5	3.0	3.5	VDC
M4	1.0	1.5	2.0	VDC
Tx Power Output	60	65	90	Watts
Mic mod sens	---	15.0	20.0	mv
Deviation	---	---	± 5.0	KHz
Tx freq. error	---	±20.0	±250.0	Hz
Tx freq. error W/ ±5 KHz Dev.	---	---	500	Hz

B. Receiver Alignment

I. Test Set-Up

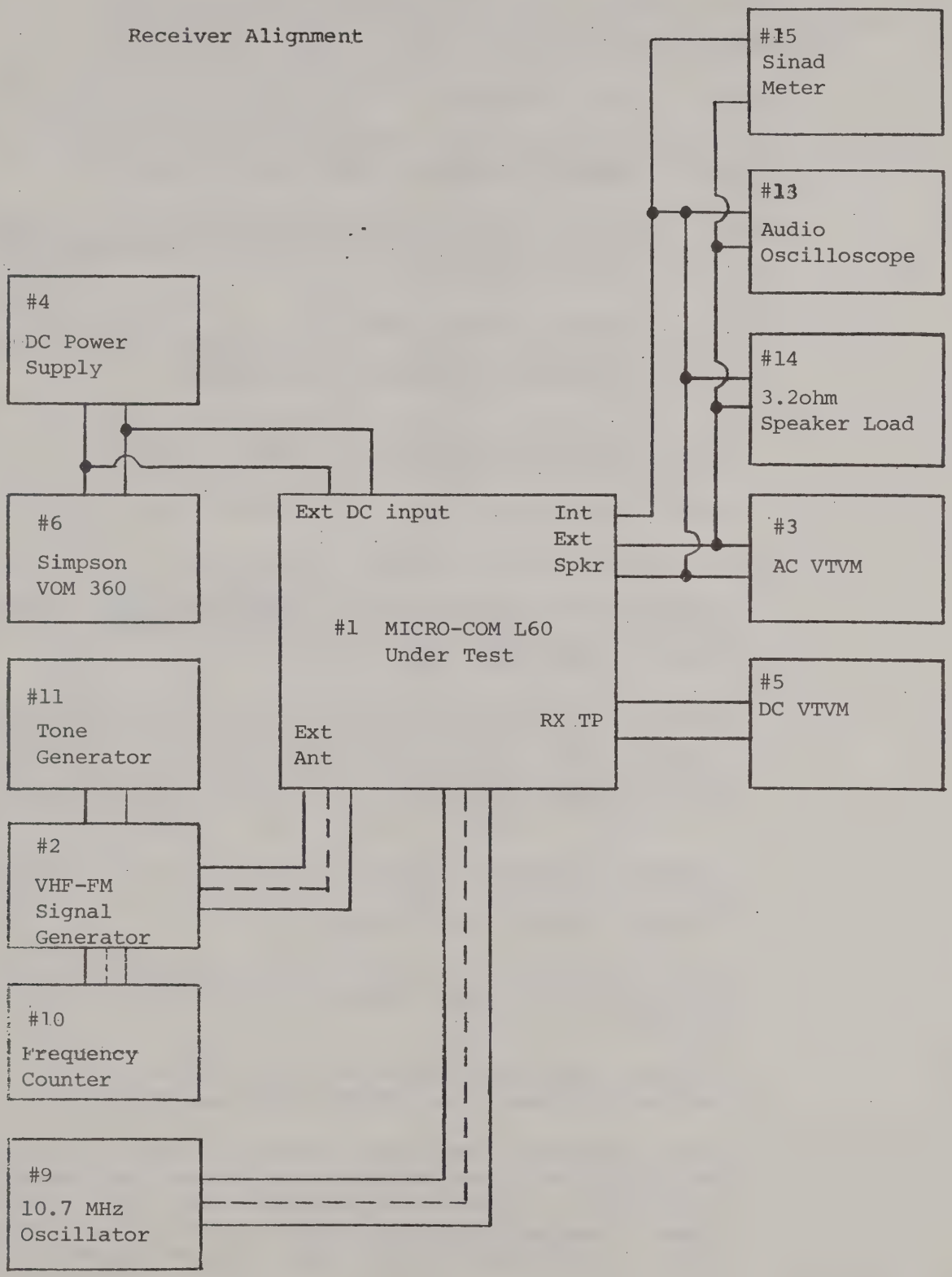
A. Equipment

1. MICRO-COM L60 Transceiver
2. VHF-FM Signal Generator*
3. AC VTVM
4. DC Power Supply
5. DC VTVM or VOM
6. VOM - Simpson 360 (Digital)
7. Hex Tuning Tool
8. Small Blade Tuning Tool
9. 10.7 MHz Oscillator
10. Frequency Counter*
11. Sub-Audible Tone Generator
12. Tune-Up Crystal
13. Audio Oscilloscope
14. 3.2 ohm Speaker Load
15. Sinad Meter or Distortion Meter with 1000 Hz Band Elimination Filter

*Can be replaced with Cushman or similar equipment

B. Test Interconnection Diagram

Receiver Alignment



DRAWN	DATE	SIZE	PART NUMBER	REV.
APPROVED Rec	DATE 9/12/75	A	TP14-214	B
DO NOT SCALE DWG.		SCALE		SHEET 7

REVS.
SH. 17
TP14-214
DWG. NO.

II. Preset Conditions

A. Set DC Input Voltage at 13.8 VDC as measured on #6 DC VOM.

B. Insert tune-up crystal. Tune-up on crystal nearest the center of the receive frequencies to be used.

C. Set VHF-FM Signal Generator #2 to tune-up crystal frequency measured on the Frequency Counter #10 and output attenuator to -130 dbm (zero output).

D. 1. Set squelch control (R402) fully CW.
2. On tone units, set tone monitor switch to monitor position, or underground microphone hangup button.

E. Set ON-OFF Volume Control (R403 to Off) fully CCW. In 4 channel models, set Channel Selector to tune-up channel.

F. Preset coil cores per Graph II, Figure 6.

III. Tune-Up Procedure (Refer To Figure #1)

A. Connect AC VTVM (#3) across the speaker load and adjust the ON-OFF Volume Control for a readable output level on the audio output AC VTVM #3 on the 1V scale.

B. Connect DC VTVM (#5) between Aø and ground; and adjust L209 (detector coil) for a 3.4 VDC on DC VTVM(#5) by feeding a strong 10.7 MHz signal into the area of L311 as indicated on the receiver tuning chart. Aø voltage should measure 3.4 VDC as indicated on the DC VTVM meter #5. Remove 10.7 MHz signal.

C. Increase the output of signal generator #2 set for 2 KHz tone and 3 KHz deviation. Observe meter #16 and increase signal generator output for 6 db sinad.

D. Adjust L204, L203, L202, L205 and L211 for best 12 db sinad. Constantly reduce signal generator #2 output for 12 db sinad on meter #16.

E. Increase signal generator #2 to 1000µv and turn volume control R403 to full level. AC VTVM #3 should exceed 3.6V AC.

F. Remove modulation from signal generator #2 and set it to -130 dbm signal level. Set AC VTVM #3 to 1V scale and use volume control to set voltage on AC VTVM #3 to 1.0V AC. Increase signal generator #2 until AC VTVM #3 reads 0.1V AC. This 20 db quieting level should be less than 0.5µv and typically 0.4µv.

G. Reduce the output of signal generator #2 to -130 dbm and set squelch control R402 to threshold just quieting receiver noise. Increase signal generator level #2 until noise appears. This is threshold squelch level and should be less than 0.3µv.

H. Turn the squelch control R402 fully counter-clockwise and increase the signal generator level until squelch opens again. This is tight squelch and should be less than 1.0μv.

IV. Table of Performance Limits

PARAMETER	MIN	TYP	MAX	UNITS
Aø	3.2	3.4	3.6	VDC
12 db Sinad		0.25	0.35	μv
20 dbQ	---	0.35	0.5	μv
Threshold Squelch	---	0.20	0.30	μv
Tight Squelch	0.4	0.5	1.0	μv
Audio Output 1 KHz Tone 3 KHz Dev.	3.6	4.0	---	VAC
Noise Output	2.5	3.0	---	VAC

C. Specifications and other data pertinent to MICRO-COM L 60

I. Specifications

a. Drawing #304-111
b. Drawing #304-110
c. Drawing #304-109

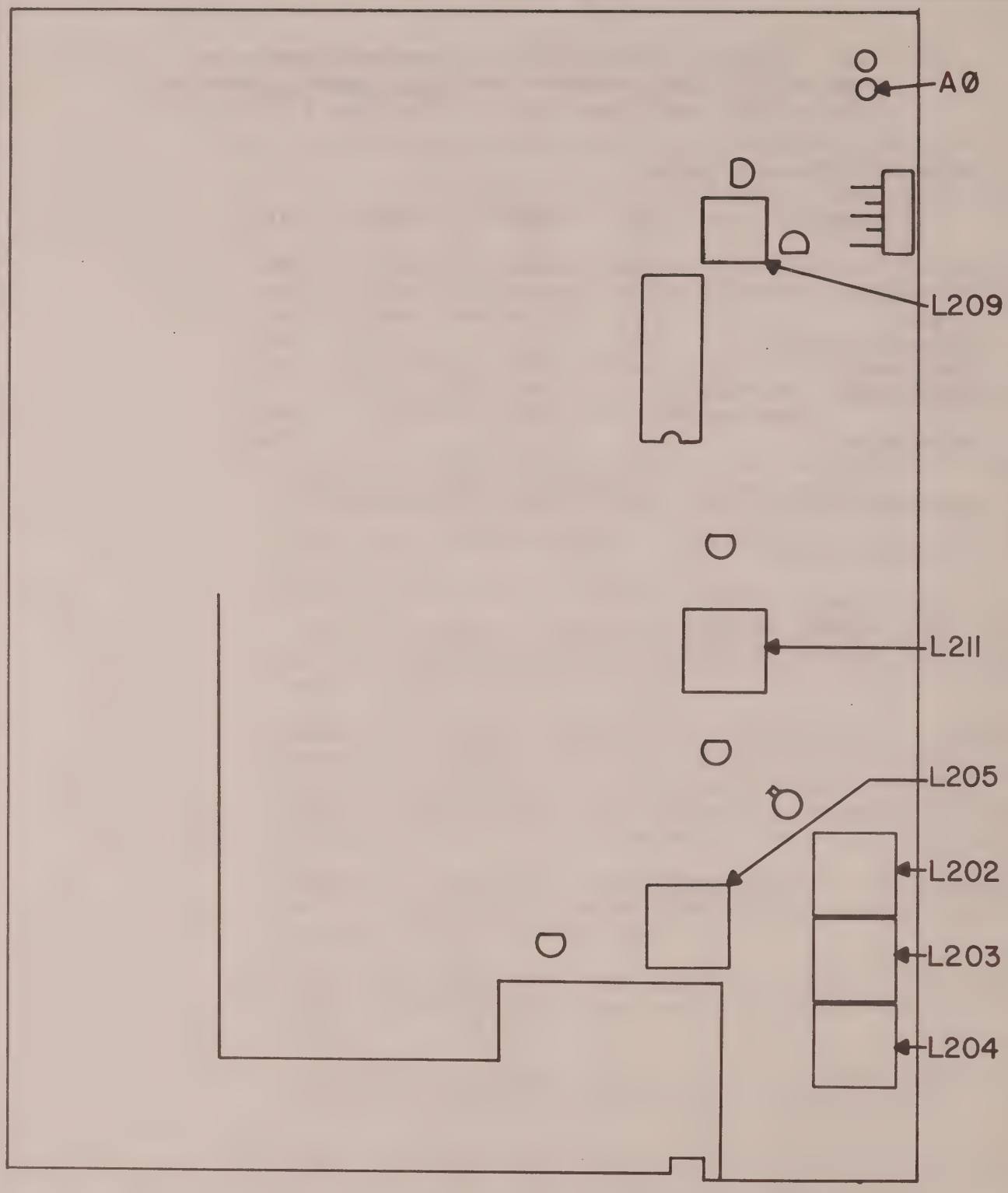


FIGURE 4

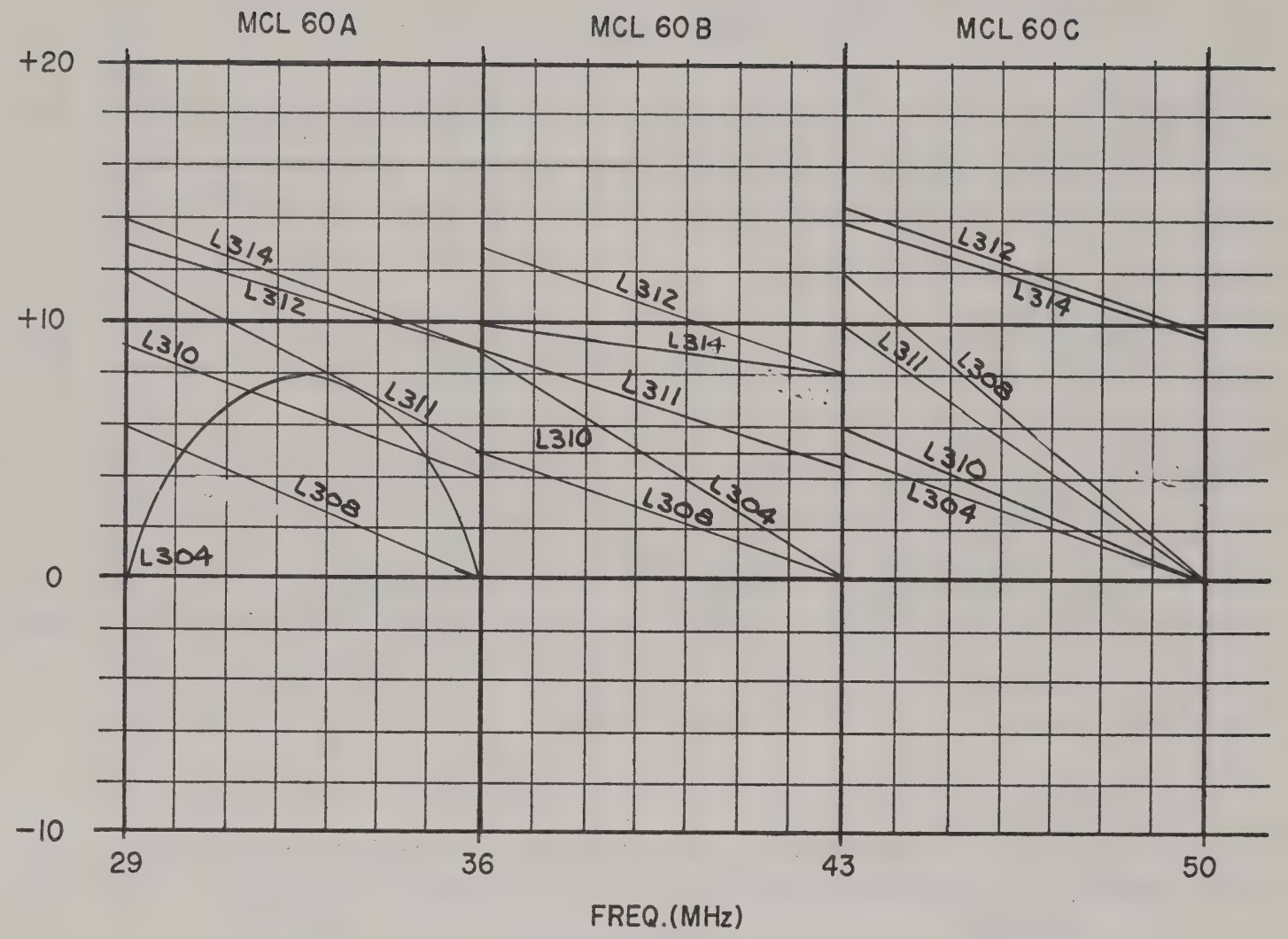
RECEIVER TUNING POINTS

DRAWN DJB	DATE	SIZE A	PART NUMBER TP 14-214	REV. B
APPROVED	DATE 8/14/79			
DO NOT SCALE DWG.		SCALE		SHEET 10

REV. B | SH. 10 | TP 14-214 | DWG. NO.

DRAWN CMcC	DATE 9-79	SIZE A	PART NUMBER TP 14-214
APPROVED KKC	DATE 9/12/79	SCALE ~	REV. B
DO NOT SCALE DWG.			SHEET 11

CW TURNS
FROM TOP
OF FORM

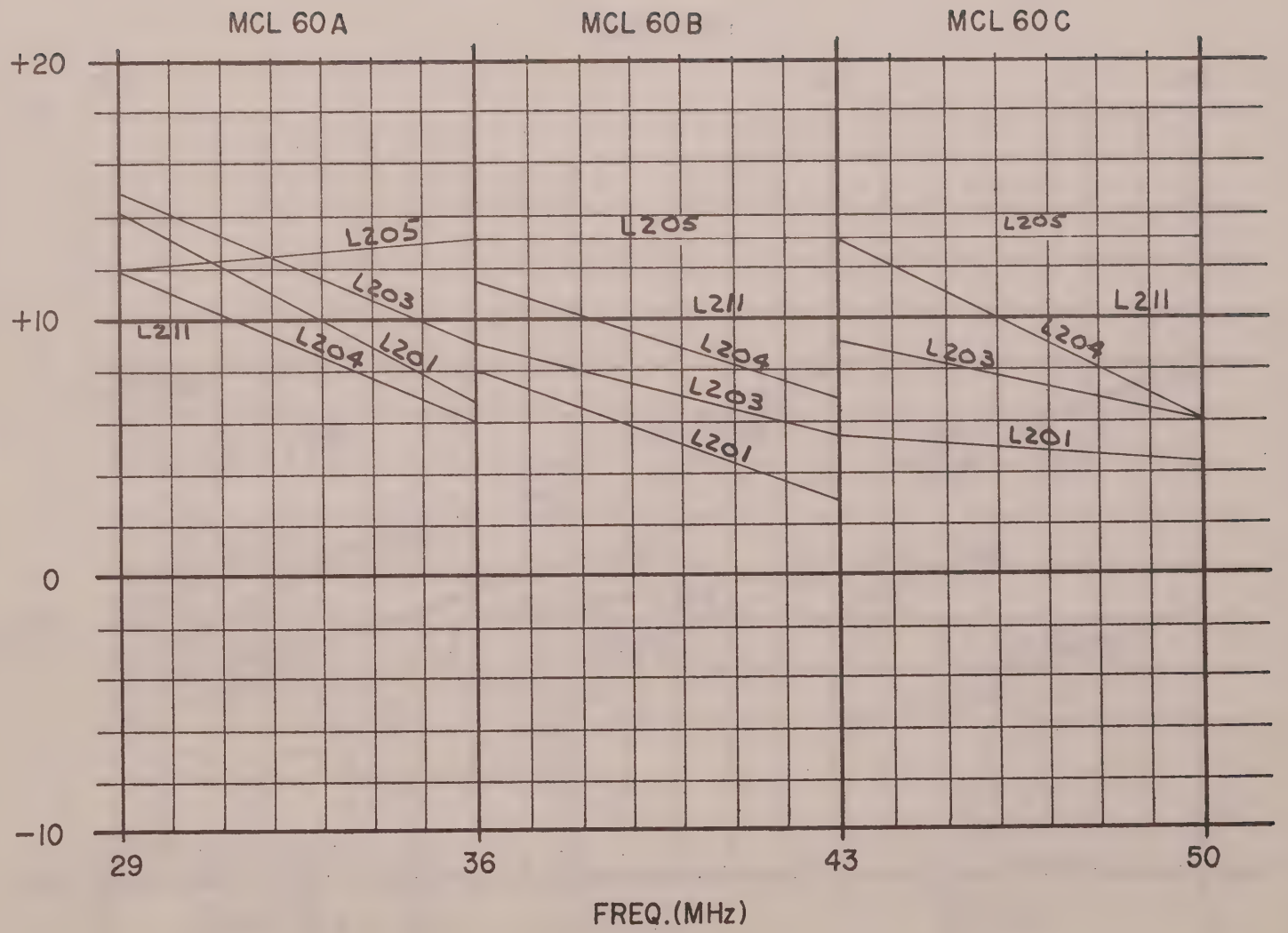


GRAPH I FIGURE 5

TX COIL PRESETS

DRAWN CMCC
APPROVED
DATE 9-79
DATE
SIZE A
SCALE ~
PART NUMBER TP 14-214
REV. B
SHEET 12
DO NOT SCALE DWG.

CW TURNS FROM TOP OF FORM



GRAPH II FIGURE 6

RX COIL PRESETS

DO NOT SCALE DWG.

DRAWN C M c C

APPROVED

DATE 9-79

SIZE A

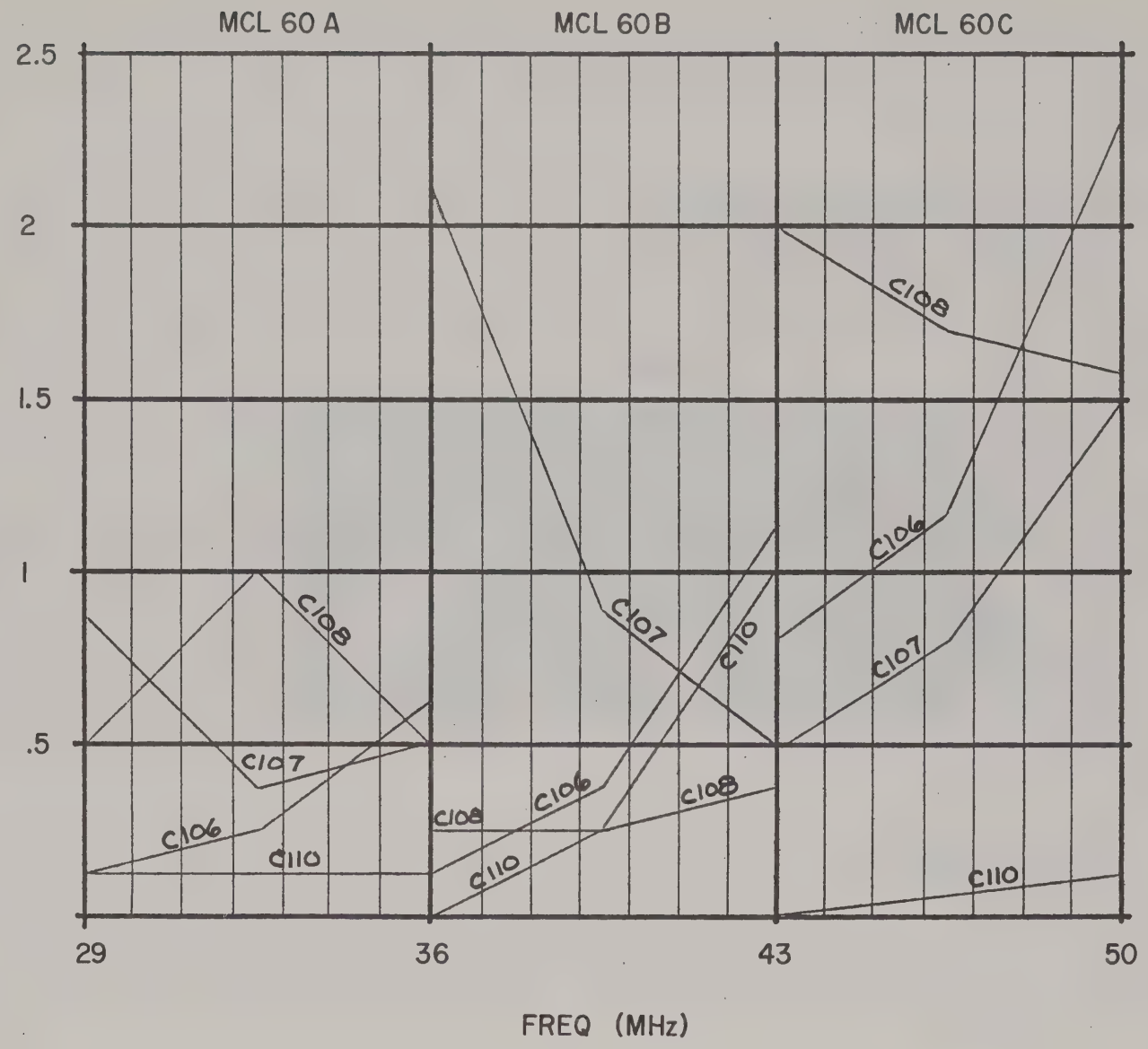
SCALE ~

PART NUMBER TP 14214

REV. B

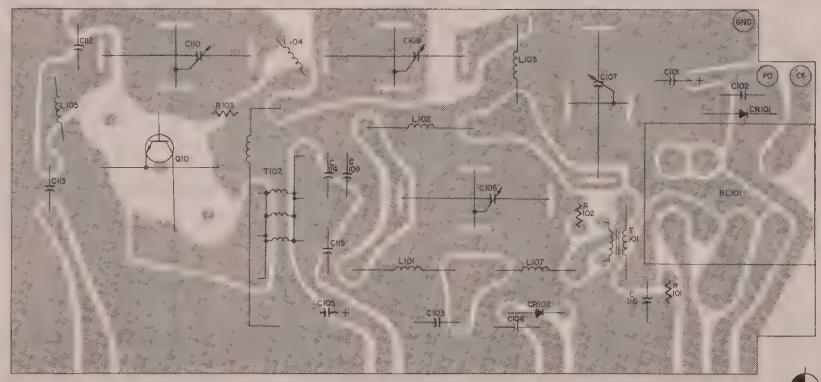
SHEET 13

Capacitor turns from tight



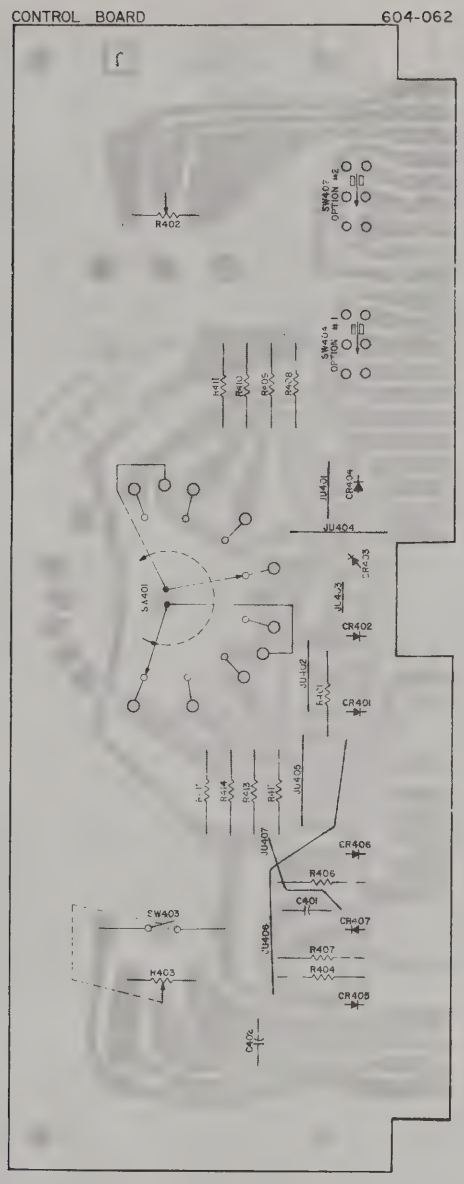
GRAPH II FIGURE 7
PA DECK CAPACITOR PRESETS

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE R-157	2-21-79	



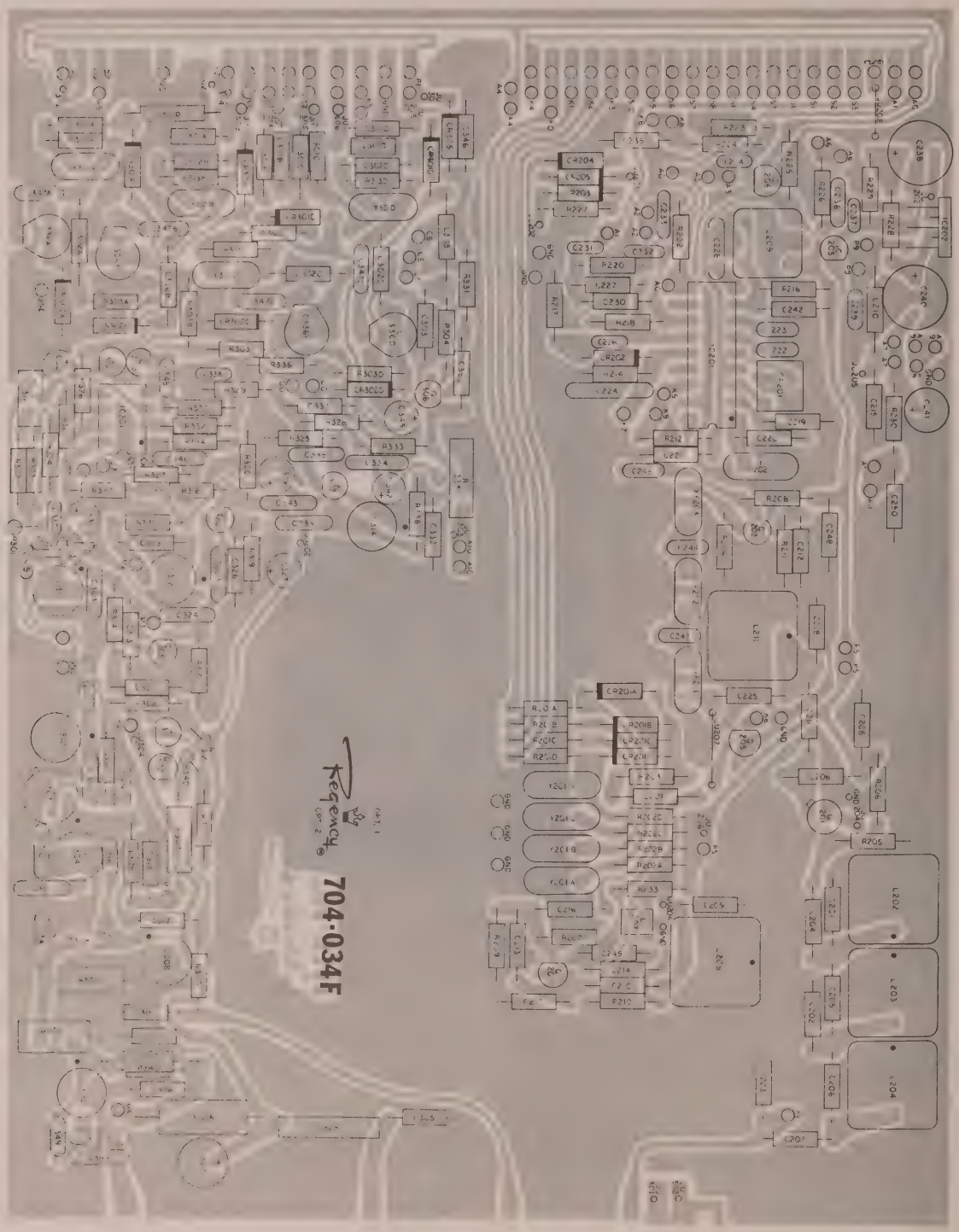
REDUCE TO 4.375 ±.003

		UNLESS OTHERWISE SPECIFIED SOME READING ARE IN INCHES TOLERANCES ARE FRACT DEC ANGLE ± .XXT ± .XXXT	APPROVALS	DATE	COMMUNICATIONS INC SATELLITE BEACH, FLORIDA 32937
			DRAWN	2-21-79	
			CHECKED		PARTS OVERLAY MCL-60 P.A BOARD
			OPER SUPV		
		MATERIAL	ENGR	2/21/79	
	MCL-60	FINISH			SIZE C / DRAWING NO. 504-293 / REV A
NEXT ASSY	USED ON				SCALE 4/1 / SHEET 1 OF 1
APPLICATION		DO NOT SCALE DWG.			

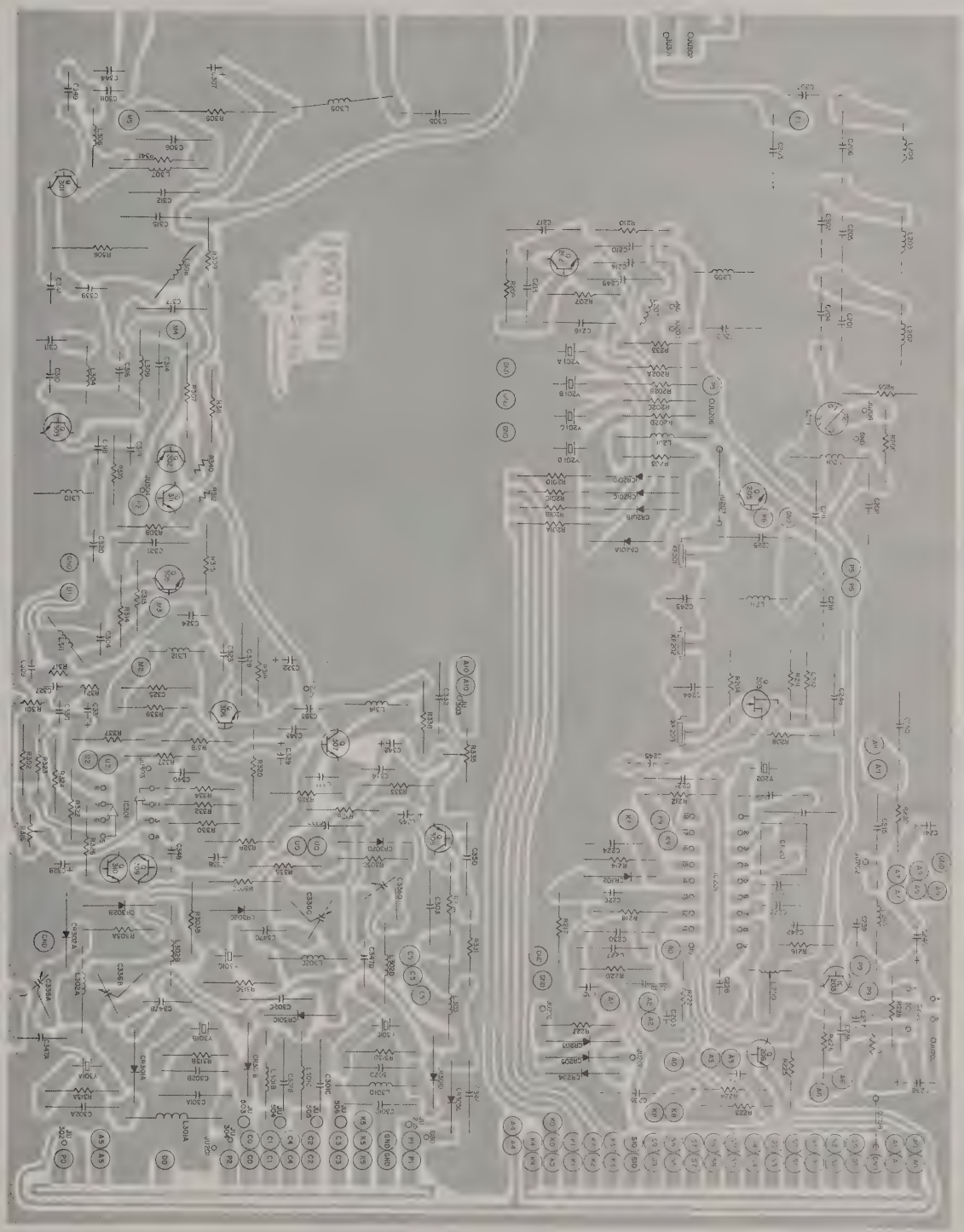


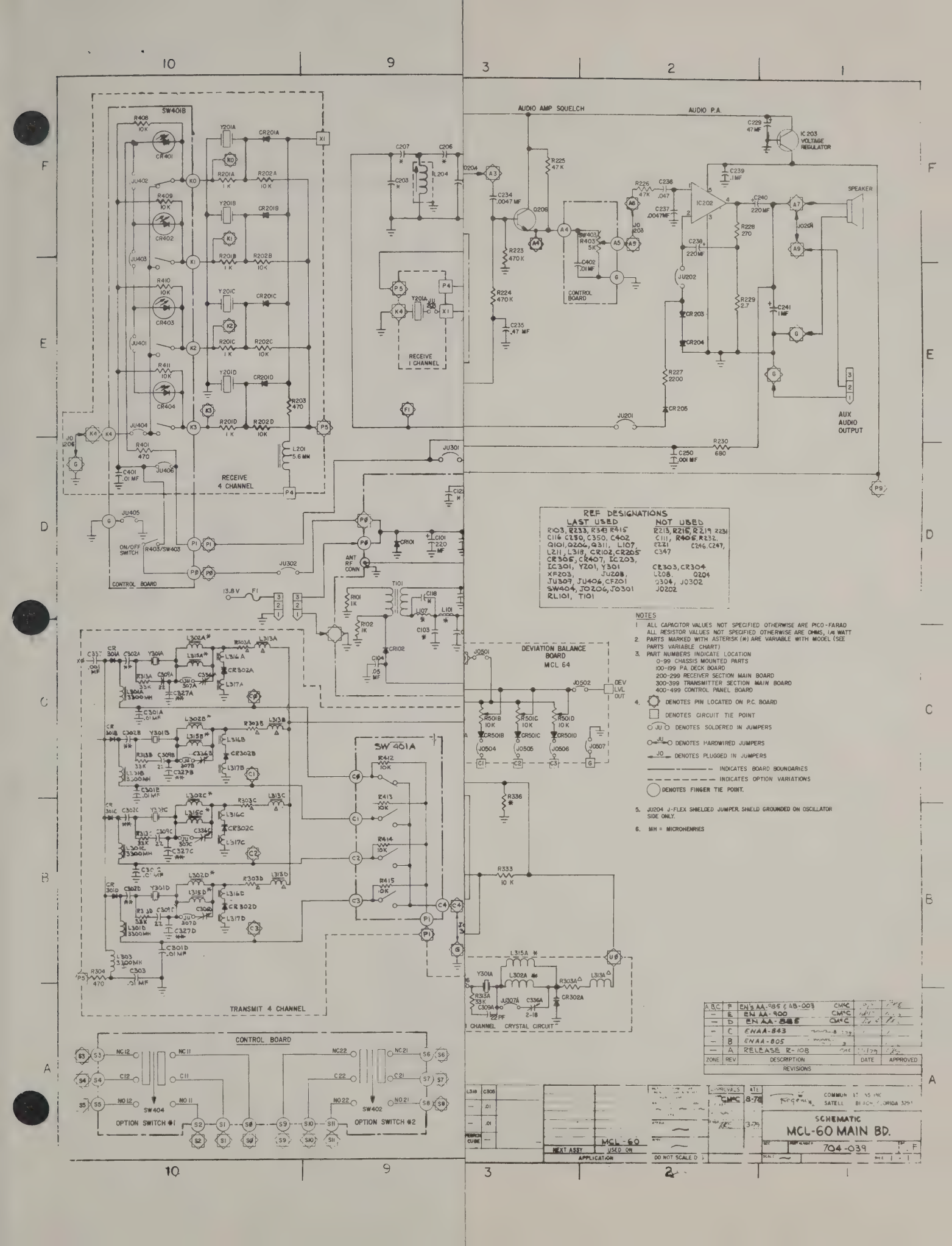
PARTS OVERLAY, CONTROL BOARD

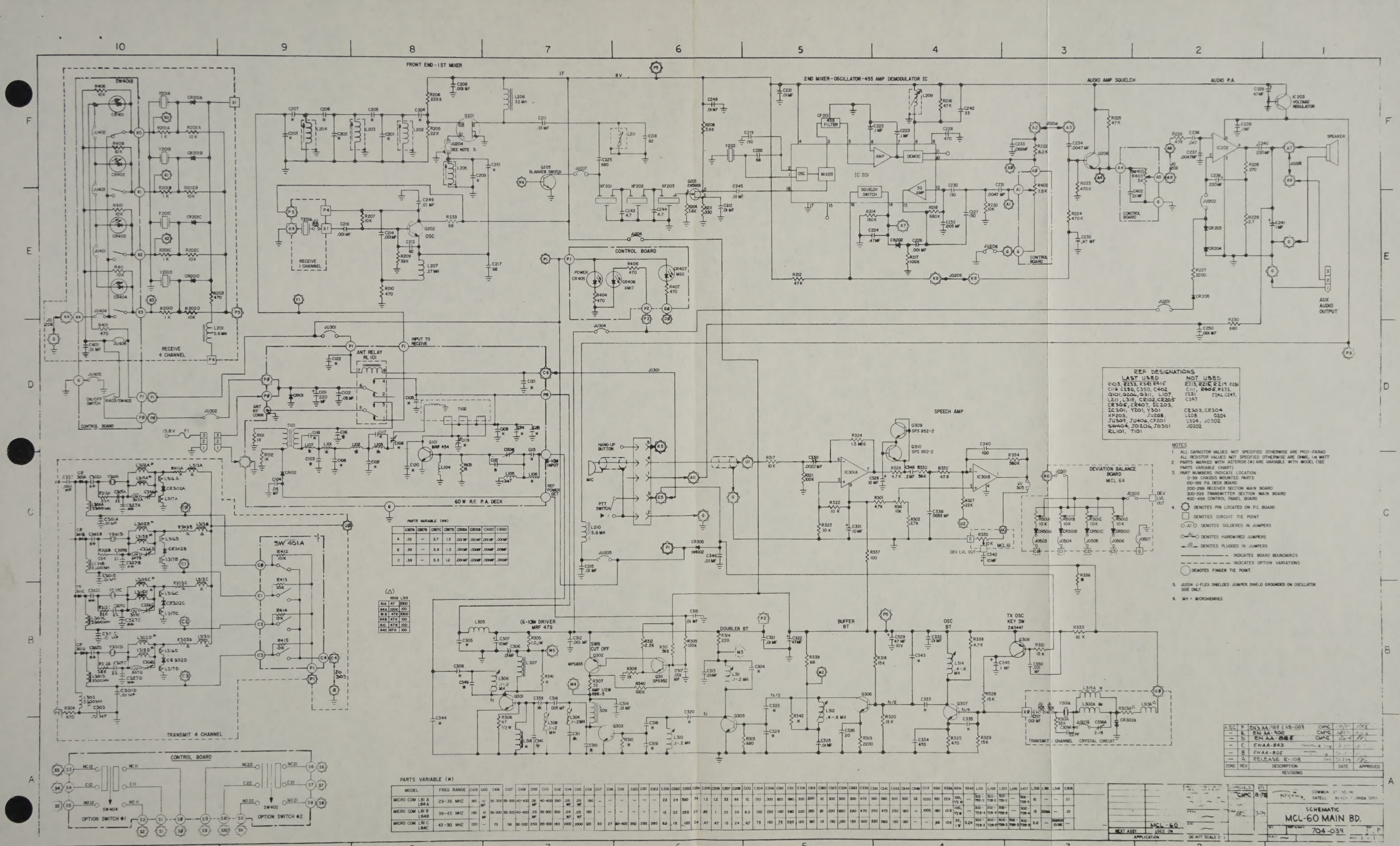
REDUCE TO 5.250±.003



REDUCE TO 5.250 I.003




AUDIO AMP SQUELCH
AUDIO P.A.
IC 203 VOLTAGE REGULATOR
SPEAKER
AUX AUDIO OUTPUT
RECEIVE 4 CHANNEL
RECEIVE 1 CHANNEL
CONTROL BOARD
ON/OFF SWITCH
ANT RF CONN
DEVIATION BALANCE BOARD MCL 64
TRANSMIT 4 CHANNEL
1 CHANNEL CRYSTAL CIRCUIT
OPTION SWITCH #1
OPTION SWITCH #2
SW404
SW402
SW 401A
SW401B
REF DESIGNATIONS
LAST USED
R103, R233, R343 R415 C116 C150, C350, C402 Q101, Q204, Q311, L107, L211, L318, CR102, CR205 CR305, CR407, IC203, IC301, YZ01, Y301 XFZ03, JU208, JU307, JU406, CF201 SW404, JO206, JO301 RL101, TI01
NOT USED
R213, R216, R219 R234 C111, R405, R232, R251 C246, C247, C347
CR303, CR304 L208, Q204 Q304, J0302 J0202
NOTES
1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, 1/4 WATT
2. PARTS MARKED WITH ASTERISK (*) ARE VARIABLE WITH MODEL (SEE PARTS VARIABLE CHART)
3. PART NUMBERS INDICATE LOCATION
0-99 CHASSIS MOUNTED PARTS
100-199 P.A. DECK BOARD
200-299 RECEIVER SECTION MAIN BOARD
300-399 TRANSMITTER SECTION MAIN BOARD
400-499 CONTROL PANEL BOARD
4. DENOTES PIN LOCATED ON P.C. BOARD
DENOTES CIRCUIT TIE POINT
DENOTES SOLDERED IN JUMPERS
DENOTES HARDWIRED JUMPERS
DENOTES PLUGGED IN JUMPERS
INDICATES BOARD BOUNDARIES
INDICATES OPTION VARIATIONS
DENOTES FINGER TIE POINT.
5. JU204 J-FLEX SHIELDED JUMPER. SHIELD GROUNDED ON OSCILLATOR SIDE ONLY.
6. MH = MICROHENRIES
A,B,C E EN's AA-985 & AB-003 CM*C
E EN AA-900 CM*C
D EN AA-845 CM*C
C ENAA-843
B ENAA-805
A RELEASE R-108
ZONE REV DESCRIPTION DATE APPROVED
REVISIONS
SCHEMATIC
MCL-60 MAIN BD.
704-039
MCL-60
NEXT ASSY USED ON
APPLICATION
DO NOT SCALE D


FRONT END - 1ST MIXER
2ND MIXER - OSCILLATOR - 455 AMP DEMODULATOR IC
AUDIO AMP SQUELCH
AUDIO P.A.
RECEIVE 4 CHANNEL
RECEIVE 1 CHANNEL
CONTROL BOARD
60 W R.F. P.A. DECK
TRANSMIT 4 CHANNEL
(6-10W DRIVER MRF 479
BUFFER BT
DOUBLER BT
OSC BT
TX OSC KEY SW
SPEECH AMP
DEVIATION BALANCE BOARD MCL 64
TRANSMIT CHANNEL CRYSTAL CIRCUIT
AUX AUDIO OUTPUT
SPEAKER
IC 201
REF DESIGNATIONS
NOTES
PARTS VARIABLE (*)
SCHEMATIC MCL-60 MAIN BD.
704-039

PARTS LIST

60W R.F. P.A. DECK

LOCATION	DESCRIPTION	PART NUMBER
RESISTORS	(all resistors are ¼W 5% unless otherwise specified)	
R101	1K	4704-0102-032
R102	1K	4704-0102-032
R103	15 ohm	4704-0150-032
CAPACITORS		
C101	22µf 16V 85D Elect	1513-0221-002
C102	.05µf +8-2 25V BC25 CD	1501-0503-003
C103 A Range	180pf 5% 500V DM-15 silver mica	1504-0181-505
C103 B Range	150pf 5% 500V DM-15 silver mica	1504-0151-505
C103 C Range	120pf 5% 500V DM-15 silver mica	1504-0121-505
C104	.05mf+8-2 25V BC25 CD	1501-0503-003
C105 A Range	10µf 35V Type U Elect	1513-0100-006
C105 B Range	10µf 35V Type U Elect	1513-0100-006
C105 C Range	not used	
C106 A Range	55-300pf EL427P trim mica	1517-0000-007
C106 B Range	55-300pf EL427P trim mica	1517-0000-007
C106 C Range	75pf DM-15 silver mica	1504-0750-505
C107 A Range	55-300pf EL427P trim mica	1517-0000-007
C107 B Range	55-300pf EL427P trim mica	1517-0000-007
C107 C Range	56pf 5% 500V DM15 silver mica	1504-0560-505
C108 A Range	90-400pf EL429P trim mica	1517-0000-008
C108 B Range	90-400pf EL429P trim mica	1517-0000-008
C108 C Range	55-300pf EL427P trim mica	1517-0000-007
C109 A Range	.05µf +8-2 25V BC25 CD	1501-0503-003
C109 B Range	.05µf +8-2 25V BC25 CD	1501-0503-003
C109 C Range	250pf 5% 500V silver mica	1504-0251-505
C110 A Range	90-400pf EL429P trim mica	1517-0000-008
C110 B Range	55-300pf EL427P trim mica	1517-0000-007
C110 C Range	55-300pf EL427P trim mica	1517-0000-007
C111	not used	
C112 A Range	390pf 5% 500V DM-15 silver mica	1504-0191-505
C112 B Range	300pf 5% 500V DM-15 silver mica	1504-0301-505
C112 C Range	180pf 5% 500V DM-15 silver mica	1504-0181-505
C113 A Range	1000pf 500V DM-15 silver mica	1504-0102-505
C113 B Range	1000pf 500V DM-15 silver mica	1504-0102-505
C113 C Range	not used	
C114 A Range	.05µf +8-2 25V BC25 CD	1501-0503-003
C114 B Range	.05µf +8-2 25V BC25 CD	1501-0503-003
C114 C Range	1000pf 10% mica	1522-0102-002
C115 A Range	.05µf +8-2 25V BC25 CD	1501-0503-003
C115 B Range	.05µf +8-2 25V BC25 CD	1501-0503-003
C115 C Range	1000pf 500V DM-15 silver mica	1504-0102-505
C116 A Range	180pf 5% 500V DM-15 silver mica	1504-0181-505
C116 B Range	150pf 5% 500V DM-15 silver mica	1504-0151-505
C116 C Range	27pf 5% 500V DM-15 silver mica	1504-0270-505

LOCATION	DESCRIPTION	PART NUMBER
C117 C Range	30pf 5% 500V	1504-0300-505
C118 C Range	27pf 5% 500V	1504-0270-505
C119 C Range	90-400pf EL429P trim mica	1517-0000-008
C120 C Range	250pf 5% 500V silver mica	1504-0251-505
C121 C Range	250pf 5% 500V silver mica	1504-0251-505
C122 C Range	250pf 5% 500V silver mica	1504-0251-505
DIODES		
CR101	Sil Rect IN4002	4806-0000-004
CR102	Sil IN4148	4805-1241-200
TRANSISTORS		
Q101	RF Power	4804-3170-904
RELAYS		
RL101	12V Guar A410-363734-12	4500-3251-900
TRANSFORMERS		
T101	coil assy VSWR	1800-3190-100
T102	RF out	5602-3272-900
COILS		
L101 A Range	11T	1801-3272-805
L101 B Range	9T	1801-3272-804
L101 C Range	6T	1801-3272-802
L102 A Range	11T	1801-3272-805
L102 B Range	9T	1801-3272-804
L102 C Range	6T	1801-3272-802
L103 A Range	6T	1801-3272-802
L103 B Range	6T	1801-3272-802
L103 C Range	6T	1801-3272-802
L104	coil	1800-5100-518
L105	coil	1801-3407-701
L106	not used	
L107 A Range	11T	1801-3272-805
L107 B Range	9T	1801-3272-804
L107 C Range	6T	1801-3272-802